

acc notes

Advanced Computer Controls, Inc.

AMATEUR RADIO

July, Aug., Sept., Oct. 1991

Repeater Mini-Notes

IDs of the Month

Still pulling from Kevin Ritchey, KD8IE's great collection (because we haven't heard from YOU!) ...

"This is KD8IE. Watch for VE testing on March 18th. Call WT8P at 371-5999 for information."

"You're on 79, KD8IE."

"With 200 watts of smoking RF, this is KD8IE."

Fiber In the Home

In our last issue, we summarized an article, "Into the Telecosm", which made the point that for our nation to benefit from the advances in computing power, our communications infrastructure needs to keep pace. And that means developing a fiber optic network into the home.

The FCC recently acted to allow this to become a reality by newly permitting telephone companies to deliver video entertainment – the only service large enough to justify the initial investment in a fiber infrastructure. And only the phone companies can afford to build it.

Also in this Issue ...

PatchMaster In Your Home	2
Most Voted – Voter Tallier	3
Radio Renegades	4
220 Revisited	7
Spread Spectrum: Then & Now	7
Technical Support Q&A	8

PatchMaster – The Ultimate Phone Patch

PatchMaster 200 is a new high-performance phone patch aimed at a wide range of two-way radio applications. Many of its features fit well into Amateur Radio, making it the ultimate "simplex autopatch."

The product breaks new ground in several ways. First, it makes communications more effective by offering powerful new capabilities, including built-in voice mail and a local telephone set port. Second, it simplifies operation in some cases by not requiring DTMF codes to access the patch and other functions. Third, it's easy to install, program (using DTMF or a terminal), and

maintain. And finally, like our repeater controllers, it's easy to use, with voice prompts and responses that tell users what's happening.

PatchMaster works in simplex systems, or through repeaters, with its sampling and VOX operating modes. Duplex and repeater controller modes let you connect PatchMaster to a repeater, and even provides a simple repeater controller function. Two mobile users or groups of users are supported with different access and privileges.

Request the PatchMaster brochure and pricing information. And read more on page 2.

Character Change For Ham Radio?

In a provocative proposal reported in the Amateur press, Ralph Haller, FCC PRB chief, suggested that the prohibitions on business communication in Amateur Radio be relaxed. He indicated the FCC would be open to a Petition for Rulemaking from the League.

Haller suggested newly permitted activities might include personal business like ordering a pizza and buying/selling ham equipment, club business, routine communications for charitable and public safety organizations, news gathering, more full participation in Skywarn, and retransmitting weather, WWV, etc.

Reportedly, his suggestion is based on the hypothesis that there's excess capacity of spectrum in the

Amateur Service which could be helpful in absorbing demand in other services like marine, business band, and public safety. There is dispute over whether he actually used the words "excess capacity". In any case, is his suggestion a welcome change, "lightening up" on unnecessary restrictions, or are there deeper implications? Should hams try to deny something that is apparent to some – that there is an overcapacity of spectrum allocated to Amateur Radio? Or should we recognize a need to either find new constructive ways to use our spectrum ... or lose it? Something to think about, because this proposal may be the seed of the next opportunity for (or threat to) ham radio.

"PatchMaster has much greater potential than just making phone calls."

PatchMaster in Your Home

Simplex autopatches have long been popular in Amateur Radio. They offer a relatively private way to place and receive phone calls over the radio.

Occasional personal phone calls are a great use of Amateur Radio, but buying a box that *just* does that can be hard to justify. That's one reason why we designed our new PatchMaster product to do so much more. Even if you just want to make an occasional phone call through your home station, PatchMaster can still help you out every day. It's unique phone patch, borrowing from ideas we pioneered in our repeater controllers, with our new ideas injected, as well.

The *typical* simplex patch connects to a phone line and a radio. It may not be programmable at all, or may be programmable using keypad and LED display that you access by taking the cover off. You bring up dial tone by entering *, and hang up with #. And it's about as useful as the patch you could buy ten years ago.

PatchMaster goes beyond this, recognizing that your radios make up a communication system, which has much greater potential than just making phone calls. The specific additions in PatchMaster include ...

- **A Local Telephone Port** which can be connected to a telephone or to one line of a multi-line telephone at home. From over the air, you can ring the home phone directly and talk to people at home, without going through the telephone network. Similarly, (depending on how you interpret control operator rules), your family members can page you or ring out over the radio from the home phones. And if either of you isn't there at the time, you can leave ...

- **Voice Mail.** From the radio,

you can leave a digital recording for home, and the phone will be rung every few minutes until it's answered and the mail retrieved. And they can leave mail for you, too, which you can retrieve easily over the radio. (If you don't like the idea of them "initiating a transmission" by ringing out, they can simply leave you voice mail and you can quickly return the call.)

The X-10 interface opens the door to integrating your radios into home automation. The X-10 remote control system, now carried in a big way by Heath, is controllable via PatchMaster and the Model 290 computer interface. Turn lights and appliances on and off from any-

where over your radio.

Programming selections are made using DTMF with voice readback of current settings, or through a terminal with easy-to-use menus. Nearly every aspect of its operation is programmable, and the menus let you quickly browse through the defaults to see what you'd like to change.

Utilities for checking out your radios include a DTMF keypad test, an echo test (to hear how you're being received at home), and the ability to force a base station ID.

If you've ever thought about getting a simplex patch, or you want more than your existing patch can offer, please contact us!

WA6ZTJ - Silent Key

On July 25, Bill Strack died as a passenger in a car accident.

Bill was a long-time ham and a project manager for Motorola communications.

Even very early in his Amateur career, Bill made outstanding contributions to the amateur community. As a fifteen year old in the early 1960s, he and a high school friend put up one of the first AM repeaters in the Los Angeles area. One of Bill's impressive accomplishments in the project was the successful negotiation for access to a repeater site - a city water treatment plant in the LA hills. Not bad for a fifteen year old.

Bill's other passion was aviation. He was able to fulfill a long-time dream when he bought a second hand helicopter and meticulously rebuilt it to better than new condition. We were fortunate to ride in the two-seater, getting a unique view of Disneyland and the LA hills. And Bill proudly showed us

his first repeater site.

At Motorola, Bill oversaw the design and installation of large public safety communications systems. He had been working on a new massive, state-of-the-art trunked radio system for Orange County and LA County Fire.

Bill was one of the first owners of our '850 controller. His private UHF repeater system is located on Mount Wilson, an outstanding site overlooking the LA basin.

Bill was a special friend of ACC. He developed the Nspector programming sheet software for the '850 controller. And he was a constant source of suggestions and ideas for unique ways of applying and improving our products.

Bill was in the back seat of the car, not wearing a seat belt, and was the only fatality. It's a terrible lesson to always buckle your seat belt. Even in the back seat. And if your back seat belts don't work, get them fixed.

Area Code Split

Phone companies are running out of telephone numbers. This is happening because of normal growth in business activity and population. But there are other factors accelerating the shortage. The number of FAX machines is exploding, and they operate best with their own dedicated lines. Modems, too, are also often given their own phone lines. And the number of home offices is increasing, meaning that homes can often have two or more lines.

All this means that there is a wave of area code splitting sweeping the nation to create new phone numbers. Here, the San Francisco area is being split into the east bay and west bay, with Oakland and other east bay cities being given a new area code (415 changed to 510).

That's one reason we enhanced the '85/'96 V5 software to allow "permitted area codes". Even with toll restriction on, ten or eleven digit numbers containing the permitted area codes are considered local, simplifying your patch management.

The '850 controller builds further on this concept to allow defining local or long distance on an exchange-by-exchange basis for nearby area codes.

Q. How do I store the Permitted Area Codes with my '85/'96 Version 5 upgrade?

A. The permitted area codes are loaded into the controller like messages, using the message editor. If, for example, you want to permit toll-free 415 numbers to be dialed through your autopatch, one of the permitted area codes should be programmed as 415. Do this by unlocking the controller, selecting one of the permitted area code messages, and entering "04 01 05". The controller will respond by saying "four one five". Now write this message into memory (*0), and you're done.

Most Voted – Voter Tallier

From Doug Waugh ...

"After innumerable hours of hard work, what we have christened the "Voter Tallier" is on-line and has been working flawlessly for the last two months. The Voter Tallier allows us to more accurately assess the workings of our multiple receiver site repeater system.

The idea for the Voter Tallier came to us as we worked with our system and discovered that we wanted more from it. When we got our RC-850 controller with a DVR, it made a great repeater system, but we still wanted more receive coverage. We added a receiver voter (made by Doug Hall Electronics) and remote receivers, then hooked the VOTED OUT outputs from our voter card to the '850 user tone inputs. However, there was one problem with this – the courtesy tone generated did not tell us anything useful about what our voting receiver system was doing.

We wanted the courtesy tone to tell us which receiver had been voted the longest amount of time for each transmission. The Doug Hall voting system samples every receiver that shows an active COS, and works very fast. Our remote receivers are GE Master II VHF receivers sent back to the main site via UHF links. The Master IIs have a variable rate squelch, which means the noisier the received signal, the longer the squelch holds open. Consequently, the courtesy tone resulting from the voter's

VOTED OUT outputs that is fed to the RC-850's user tone inputs will be the one from the receiver location receiving the *noisiest* signal. This caused our problem. The noisiest signal at the end of a transmission is *not* a reflection of which receiver has been voted the longest.

To accomplish our goal of meaningful courtesy tone output we decided to build a microprocessor based voted-out counter. Our creation is based on the Motorola 68HC11 microprocessor. The Voter Tallier directly interfaces to the RC-850 controller and Doug Hall voter cards, and up to eight remote receivers can be used. It also has a single-digit display indicating the receiver with the highest total time voted during the transmission.

By utilizing the Voter Tallier we are now able to keep track of the amount of time each receiver is voted. The Voter Tallier generates a courtesy tone code that is sent to the '850's user tone inputs. This code results in a tone that always represents the receiver voted the longest total time.

Our problem is solved. Because the Voter Tallier assures that the courtesy tones are valid, we can now more effectively use them as a diagnostic aid. We always liked our '850 controller, and adding the Voter Tallier puts the icing on the cake!

For more information, feel free to contact Doug Waugh or Dan Feind. Rt. 1, Box 539, Springfield, MO 65803. (417) 836-5878.

Wider Calling Area in California

Pacific Bell (northern CA / NV) recently significantly expanded the calling area for its customers. Calls that previously would have been toll calls are now considered local.

If your phone company hasn't recently expanded your local

calling area, it's something that you may be able to look forward to. It means that your repeater patch will be even more useful, since your users will be more likely to make calls that don't run up the repeater phone bill.



Other Notes of Interest

In Brief

New Books From the IEEE

Here are two new books from the IEEE Press (Institute of Electrical and Electronics Engineers).

Land-Mobile Communications Engineering brings together material from scattered and sometimes difficult-to-obtain publications. It's designed to assist the engineer engaged in system design or applications engineering of mobile communications. It treats both the

demanding environment posed by frequency bands above 800 MHz, as well as the more familiar lower frequency bands. Experienced engineers and newcomers to the field will find this collection a convenient overview as well as a single source for many of the references they use frequently. Price: \$64.95 (\$52.00 for IEEE members).

Perspectives on Packetized Voice and Data Communications, edited

by AT&T Bell Labs, develops the concept of carrying all information on a single unified telecommunications network. This book should be of particular interest to those interested in broadband ISDN. Price: \$49.95 (\$40.00 for IEEE members).

Order either of these books from the IEEE at (908) 981-0060.

"The Bad Boys of Ham Airwaves Bicker, Berate Each Other, and Bend FCC Rules."

Radio Renegades Make the L.A. Times

An article in the Los Angeles Times by Bob Pool should make every ham cringe. On the front page of the lifestyle section "View", an 80 column-inch article with three photos, titled "Radio Renegades", details the distasteful activities on the 147.435 MHz Mt. Wilson repeater.

"During one five-minute period last month, various hams heard themselves labeled on the Mt. Wilson repeater as 'a lying scumbag,' 'pothead' and 'drunken fool.' And those are the milder descriptions.

"Hams who use the other 320 mountaintop repeaters in Southern California to amplify their low-powered, 2-meter walkie-talkies and transceivers grumble that such talk is outrageous.

"The channel often sounds like a bunch of drunken sailors at a waterfront bar. It's not a church. If you stick your nose in there thinking you're going to get a church service, you're wrong.

"But users of the '4-3-5 repeater,' as they call Mt. Wilson, claim it's all good, clean fun."

The article describes the communications practices of Ted Sorenson III, Richard A. Burton, David Hildebrand, and others who frequent the repeater.

"Ham radio is a hobby, and hobbies are supposed to be fun. There's a switch on my radio - if I get offended, I'll turn it off (Darin Jones)."

The article isn't a complete hatchet job - while it's a black eye for amateur radio, it does point out that the Mt. Wilson repeater activities are unusual in amateur radio.

"While most of the 500,000 amateur radio hobbyists in the U.S. are viewed as genteel, eccentric electronics tinkerers, those using the ham radio relay station atop a Malibu ridge have become the bad boys of the airwaves. Other hams are preoccupied with antennae and transmitter tubes as they tap out Morse code messages to fellow

hobbyists worldwide. Unfailingly, they are polite and proper as they answer inquiries about signal strength and reception. Things are different at the Mt. Wilson Repeater Assn.'s frequency, which is heard at 147.435 MHz on shortwave radios and scanners in Southern California."

Most of the participants are well known. But there is a line ... "Renegades or not, those using the repeater say they draw the line at one thing: jamming. Hams such as Clarke Harris of Torrance have installed sensitive radio directional finders atop their cars that can be used to track down those interfering with conversation. Abusers are reported to the FCC."

It's a case of "man biting dog" making the paper. And in the process, a hard-to-repair image of Amateur Radio has been created in the minds of tens of thousands of newspaper readers.

Thanks to Dennis Gibson, WB6TNB, for bringing this to our attention. Los Angeles Times, October 2, 1991.



Name: _____ Date: _____

Organization: _____ Call Sign: _____

Mailing Address: _____ Shipping Address (not a P.O. Box): _____

Day ☐ _____ Evening ☐ _____

Comments: _____

Custom Sheet Header (Inspector orders only) _____

To speed processing of your order, please . . .

- ✓ Provide both a mailing and shipping address
- ✓ Provide both day and evening telephone numbers where you can be reached
- ✓ Shipping address cannot be a P.O. Box (UPS does not deliver to P.O. Boxes)

① Subtotal \$ _____

② Credit for previously purchased manual - \$ _____

③ New subtotal \$ _____

④ CA and FL residents add sales tax
 (1% 3 times 6.0, 7.25, 7.5, 7.75, or 8.25%) \$ _____

⑤ Shipping and insurance
 (UPS second day air):
 RC-850 - \$26.00 DVR - \$21.00
 RC-96 - 16.00 RC-85B - 11.00
 PatchMaster 200 - 15.00
 FC-800/CIB - 8.00 Accessories - 5.00
 Manuals - no charge
 International - call for quote \$ _____

⑥ C.O.D. fee (\$4 if applicable) \$ _____

⑦ TOTAL DUE \$ _____

⑧ Deposit enclosed - \$ _____

⑨ BALANCE DUE \$ _____

Warranty periods are:

- RC-850 Repeater Controller - 2 years*
- RC-96 Repeater Controller - 2 years*
- RC-85 Repeater Controller - 2 years
- Digital Voice Recorder - 1 year
- PatchMaster 200 - 2 years
- * - Includes coverage for damage due to lightning

METHOD OF PAYMENT

- Check enclosed for total amount due
- Deposit encl. w/ balance due prior to shipment
- Deposit encl. w/balance due COD Cert. Funds
- Charge to a VISA / Mastercard
- Company p. o. - subject to credit approval

P.O. # _____
 (Hard copy required prior to shipment)

Credit card #: _____

Expiration date: _____

Name on card: _____

address: _____

Signature: _____

2356 Walsh Avenue, Santa Clara, California 95051
 (408) 727-3330

**Price List and Order Form
 (Amateur Radio Products)**

Price List #891A

**(408) 727-3330
 FAX (408) 727-3413
 Technical Support (408) 727-3414**

Thank you for your order!

All products are sold under Software License Agreement.
 Prices and specifications are subject to change without notice.
 Prices quoted in United States Dollars.

TERMS AND CONDITIONS

ORDERING

Advanced Computer Controls' Amateur Radio products are available factory direct. PatchMaster is also available through authorized land mobile radio resellers.

ACC welcomes orders by telephone, FAX or mail. Ordering assistance is available by telephone. Please call ACC for any additional information needed.

PRICES

Prices do not include any taxes. All prices are in United States Dollars and are subject to change without notice. Amateur discount pricing is available for prepaid orders placed in the name of a licensed Amateur Radio operator.

SHIPMENTS

Prices are F.O.B. Santa Clara, CA. Shipping and insurance costs are additional. The shipping address must be a street address (not a P.O. Box). Prices include packing suitable for domestic shipping. Export packing and freight are extra.

PAYMENT

Terms are NET 30 days upon approved credit, except for customers qualifying for Amateur discount price. A hard copy purchase order is required prior to shipment. Orders received prior to credit approval or orders exceeding credit limit can be accompanied by certified check, VISA or Master Card, or can be shipped C.O.D. (\$4 C.O.D. and handling fee). Partial shipments will be invoiced. Interest will be charged at the rate allowed by law to accounts past 30 days.

TITLE

Title to the products and risk of loss pass to the buyer upon ACC's delivery to the carrier, regardless of any provisions for payment of freight or insurance or form of shipping documents. The method of shipping and packaging will be in accordance with ACC's then current standards. Shipping dates provided by ACC are approximate only. ACC shall not be liable for any loss, damage, or expense (consequential or otherwise) incurred by the buyer if ACC fails to meet specified delivery dates.

LIMITED WARRANTY

Advanced Computer Controls, Inc. warrants that the products manufactured by ACC will be free from defects in material and workmanship for the warranty period from the date of shipment. The liability of ACC is limited to replacing or repairing, at ACC's option, any defective products which are returned to ACC, Santa Clara, California. In no case are products to be returned without first obtaining permission from ACC. The foregoing warranty shall not be valid: (i) if the products or parts have been subjected to misuse, accident, alteration, neglect, unauthorized repair or installation; (ii) for expendable items with the products; (iii) for custom equipment or products produced to reseller's specifications. ACC shall make the final determination as to the existence of any alleged defect.

Except as herein above provided, ACC makes no warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose, and shall not be liable for incidental or consequential damages. All implied warranties are limited in duration to the above stated warranty period. Some states do not allow the exclusion or limitation of incidental or consequential damages or on how long an implied warranty lasts.

LIMITATION OF LIABILITY

ACC's liability under or for breach of this agreement shall be limited to refund of the purchase price. In no event shall ACC be liable for costs of procurement of substitute goods, loss of profits, or for any special, consequential, or incidental damages, however, caused, whether for breach of warranty, breach of contract, negligence, or otherwise.

Model	Description	Price	Amateur Price*
RC-850 REPEATER CONTROLLER with Version 3 Firmware			
<input type="checkbox"/>	RC850 Controller in rack mount enclosure with display	2900	2700
<input type="checkbox"/>	CIB Computer Interface with Vocabulary Expansion	525	350
<input type="checkbox"/>	PS Nspector™ Programming Sheet Software for IBM PC**	115	95
<input type="checkbox"/>	FC900 Interface for ICOM IC-900/901 FM Mobile band units	295	250
<input type="checkbox"/>	FC1 Interface for BCD controllable radios	60	55
<input type="checkbox"/>	TS32 Communications Specialists CTCSS Decoder - Installed	120	100
<input type="checkbox"/>	MC48 Local Microphone	100	85
<input type="checkbox"/>	M850 Extra technical manual***	45	35
RC-96 REPEATER CONTROLLER with Version 5 Firmware			
<input type="checkbox"/>	RC96 Controller in rack mount enclosure with keypad/display	1550	1365
<input type="checkbox"/>	RC96P Controller in rack mount enclosure with plain front panel	1380	1215
<input type="checkbox"/>	TNP CTCSS Tone Panel with one tone installed	200	175
<input type="checkbox"/>	EAT Additional Decode Tones for Tone Panel	45	35
<input type="checkbox"/>	AD2 Audio Delay Line Board Kit	185	160
<input type="checkbox"/>	FC900 Interface for ICOM IC-900/901 FM Mobile band units	295	250
<input type="checkbox"/>	FC1 Interface for BCD controllable radios	60	55
<input type="checkbox"/>	M96 Extra technical manual***	25	15
RC-85 REPEATER CONTROLLER with Version 5 Firmware			
<input type="checkbox"/>	RC85B Controller board	1050	895
<input type="checkbox"/>	AD2 Audio Delay Line Board Kit	185	160
<input type="checkbox"/>	FC900 Interface for ICOM IC-900/901 FM Mobile band units	295	250
<input type="checkbox"/>	FC1 Interface for BCD controllable radios	60	55
<input type="checkbox"/>	M85 Extra technical manual***	25	15
DIGITAL VOICE RECORDER			
<input type="checkbox"/>	DVR DVR in rack mount enclosure with 256K memory	1350	1150
<input type="checkbox"/>	CH2/3 Second (and third) record/playback channels	250	200
<input type="checkbox"/>	MX3 256K byte memory (up to three additional)	125	100
<input type="checkbox"/>	MDVR Extra technical manual***	15	10
PATCHMASTER 200 RADIO TELEPHONE INTERCONNECT			
<input type="checkbox"/>	PM200 PatchMaster 200	1200	960
<input type="checkbox"/>	PM200SL PatchMaster 200 / Single line, no speech synthesizer	1050	840
<input type="checkbox"/>	PCM1 PCM Voice Delay	100	80
<input type="checkbox"/>	PCM2 PCM Voice Delay and Prompts	180	145
<input type="checkbox"/>	PCM3 PCM Voice Delay, Prompts and Mailbox	375	300
<input type="checkbox"/>	CTCSS CTCSS Encode/Decode Module	115	92
<input type="checkbox"/>	MODEM Internal 1200 Baud Modem	150	120
<input type="checkbox"/>	LOG ANI and Call Logging	450	360
<input type="checkbox"/>	GEN Radio Cable - Generic, pigtail	35	30
<input type="checkbox"/>	MAN2 Extra technical manual ***	25	20

* Amateur Price is available for prepaid orders (check, VISA, MasterCard, or C.O.D.) placed in the name of a licensed Amateur Radio operator or an Amateur Radio organization - not a company or government agency.

** Nspector orders require specifying a "sheet header" which will be printed on each programming sheet. Use your callsign or the name of your repeater organization. See the line on next page for writing in your custom sheet header.

*** The cost of a previously purchased manual is applicable as a credit toward your new equipment.

220 Revisited

Now that appeals didn't prevent the loss of 220-222 MHz to Amateur Radio, we can sit back and watch.

The licensing process for the 220 MHz frequencies was a lottery that opened on May 1 and closed after only a few weeks. The FCC received 59,000 applications on top of its normal workload. By mid-September, Gettysburg had keyed nearly all of them in. That's not to say they've had a chance to look at them – they've simply entered them into the computer so that they will be available for the public to see. The real work, carefully reviewing each application, will wait for the outcome of petitions for reconsideration that may affect the process.

Since licenses are of great value, the avalanche resulted from speculators applying for frequencies they hope to sell later to legitimate users.

The FCC processes about one million applications per year – most of them routine renewals. It hopes to progress to electronic filing (file or renew from your PC via modem) to eventually reduce the paperwork.

But for now, from our perspective, clogged wheels due to the 220 speculative avalanche is their just dessert!

User Fees

For years, radio users have had a free ride – they've been granted free access to spectrum and they could charge the public for their service. Congress is attempting to institute user fees, but there have been cries of inequities. Each FCC bureau was allocated its share of expenses that has to be made up in fees. But in the Private Radio Bureau, public safety and amateur users wouldn't be charged, so the bureau would have to make up the difference by increasing fees to its other users. Private community repeater and SMR owners would pay far more than cellular operators or broadcasters (which are under different bureaus) for use of their frequencies. No one is mad at hams for not carrying their weight, but recognize that if user fees ever happen, someone else will be paying our way at the FCC.

Spread Spectrum - Then and Now

Spread spectrum, a thirty year old communications technique, is receiving new attention in system design. But the benefits that are of interest today are different than those that led to the development of the technology many years ago.

Very simply, spread spectrum involves spreading a transmitted signal over a wide bandwidth, by quickly "hopping" among a set of radio frequencies, or using other techniques. The receiver must have the identical "key" in order to follow the signal as it hops from frequency to frequency.

Originally, the technique was developed for military applications involving communication in hostile environments – spread spectrum transmissions are tolerant of intentional, smart jamming.

Now, other benefits of the technology are lending themselves to current non-military needs, including the next generation of digital cellular and potential personal communications networks. There are four additional major benefits of spread spectrum.

- *Reduces the effects of multipath.* At high frequencies, a radio signal can travel over more than one path from the transmitter to the receiver. The signal can bounce off objects like buildings and mountains, resulting in several signals reaching the receiver with different propagation times. These signals add or cancel, depending on their relative phase. If the transmitter or receiver is moving, the situation is complicated further, because the cancellation, or fading, changes quickly, and different propagation times lead to distortion and jitter. Fading is frequency dependent and fades are narrowband (up to about 10 MHz wide). If the signal is narrowband, it is susceptible to deep fades with a complete loss of information. On the

other hand, if the signal is sufficiently wideband like a spread spectrum signal, redundancy in the transmitted information can prevent its total loss.

- *Allows more users to share a block of spectrum.* Since users aren't given an exclusive frequency assignment, but rather a frequency range in which to spread their signal, the effect of adding new users is to gradually increase error rates to the point of reducing signal quality. The interference is then self-limiting – if the channel becomes too noisy, users with relatively unimportant traffic will "hang up" and try again later, leaving the spectrum for use by those with the most important traffic, resulting in optimum sharing.

- *Can be overlaid on top of existing narrow band (FM).* Mutual interference can be reduced if the spread spectrum system is smart enough to avoid the frequencies occupied directly by the narrow band users. Spread spectrum users become less vulnerable to interference, and can operate at lower power levels, and so are less likely to cause interference, as well. This benefit may allow future personal communications spread-spectrum to be authorized on top of utility microwave frequencies – something that the utilities aren't anxious to see.

- *Spread spectrum is inherently private.* Since the signals are noise-like and each user has its own private code, it is extremely difficult to "eavesdrop."

By optimizing spread spectrum systems to meet today's needs – spectrum management vs. working in a hostile environment – performance has been improved. Its benefits make it a candidate for the next generation of digital cellular in the form of CDMA (code division multiple access), for wireless local area networks, and for low power Part 15 consumer devices.

Technical Support Q&A

Q. When I try to use my '850's mailbox from my terminal, no messages are displayed. What's wrong?

A. The '850 has an electronic mailbox which lets users leave canned synthesized voice messages for other users. Numbers can also be appended to messages to include phone numbers or frequencies as part of the information. Messages can be sent and retrieved over the radio and telephone. They can also be sent and retrieved from a computer terminal through the controller's computer interface. (This messaging capability is separate from the Digital Voice Recorder's *true voice mail* capability.)

Back to the question, remember that the 850's ten mailbox messages must be programmed as text matching the canned synthesized voice messages that you've programmed.

You program the text version of the messages from the terminal using the T command. Separate programming of the synthesized voice and text message lets you spell out the words correctly in text, even when you use "words" like "u", "r", etc. In this way, they are spelled correctly (i.e. "you", "are", etc.) when displayed on the terminal.

Q. How do I clear out an unwanted setpoint in my scheduler?

A. A setpoint defines the time and day of week of a scheduler action, such as changing macro set, or with the '850, an event such as transmitting a message out the repeater or a link, etc. When you have a setpoint programmed which you need to cancel, simply reload it with an invalid time like 00:00. For example, to cancel out Setpoint 5, with the controller unlocked, enter *420500000001. Now setpoint 5

will never match a valid time and is effectively cancelled.

Q. After I installed Version 5 in my '85/'96, my remote bases stopped working. Why?

A. There's a little housekeeping required when installing the new software. Assuming you're not adding an HF remote, you need to program an empty HF command prefix. You also need to program the link COS to active high (it's programmable now).

With the controller unlocked, enter *5020 to load an empty HF prefix, and enter *5411 to set the link COS active high.

If you have an FC-900 interface, you must set DIP switch 7 ON ('96) or OFF ('85). If not, set it in the opposite position.



2356 Walsh Avenue
Santa Clara, CA 95051

**Archive of K6COP
WR6COP Repeater**